II. Restriction Requirement Made Final

On page 2 of the Office Action, the Examiner acknowledged the election of group II with traverse, and made the Restriction Requirement Final.

The Applicants have cancelled claims 11-16 without prejudice to exepdite the prosecution of the present application.

III. Objections To The Specification

On Page 2 of the Office Action, the specification was objected to. Specifically, the Examiner objected to the use of arsine on page 6, line 17, and the use of ammonia on page 7, line 4.

The Applicants have amended the specification on page 7, but respectfully traverse the objection to the use of arsine in light of the arguments below.

The present invention teaches that ultraviolet light can be used to dissociate the nitrogen ion from ammonia and other notrogen-bearing molecules. The present invention performs this by using microwaves to excite xenon gas or mercury gas that has been mixed with the nitrogen bearing gas.

As the Examiner points out, arsine is not used to form a nitride, but the properties of arsine, namely the lowering of the activation energy in the presence of ultraviolet light, are well known. The present invention extends that principle to ammonia and nitrogen bearing compounds which was not previously thought possible because of the much higher activation energy of nitrogen. The use of arsine on page 6 of the specification is for comparison purposes only.

IV. Art-Based Rejections

On Page 2 of the Office Action, claims 1-5 and 17-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamazaki et al. On Page 3 of the Office Action, claims 5-10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 07291791.

A. The Yamazaki Reference

The Yamazaki reference teaches the use of a mercury lamp located outside of the vacuum chamber to excite molecules inside of the vacuum chamber in order to form CVD semiconductor compounds. Yamazaki specifically discusses the use of a lamp

outside of the chamber in Col. 1, lines 14-25, and states that the use of the photo CVD method is preferred to a plasma CVD method because the plasma CVD method injures the surface of the substrate.

B. The JP 07291791 Reference

The JP 07291791 reference discusses using molecular beam epitaxy equipment with a plasma generator to grow gallium nitride. The JP reference does not mention any plasma gas, e.g., xenon, mercury, etc., to generate photon emissions to excite the nitrogen molecule for growing the gallium nitride material.

C. Claims 1-10 and 17-20 are patentable over the Yamazaki and JP 07291791 References

The Yamazaki and JP 07291791 references, alone or in combination, do not show the teachings of independent claims 1, 5, and 17 of the present application.

Amended claim 1 discusses the use of the plasma molecule within the same chamber as the nitrogen-bearing molecule. Yamazaki teaches separating the plasma molecule from the nitrogen-bearing molecule within a lamp bulb 91 (Col. 3, lines

34-60), and FIG. 1 shows the mercury bulbs in a chamber 5 outside of the reaction chamber 1 (Col. 5, lines 23-48).

Yamazaki also does not generate the light emission from within the chamber as claimed in claim 1.

Further, Yamazaki specifically avoids using plasma as mentioned in Col. 1, which is how the present invention generates the excitation for the plasma molecule to emit ultraviolet light.

The JP 07291791 reference does not show the use of plasma molecules within the chamber. The Examiner noted that there is no mention of the limitation of a plasma gas molecule inside of the chamber as specifically claimed in amended claim 1, the limitation of a reactant gas that flows into the excitation beam thereby generating a plasma as specifically claimed in claim 5, and the limitation of the photon emission being emitted from within a chamber containing the molecule as claimed in amended claim 17, nor are these limitations obvious given the teachings of Yamazaki and JP 07291791. The assumption that there is a reactant gas by the Examiner does not take into account the use of microwave energy alone to dissociate atoms without the use of plasma ions.

Even if it were possible to combine the teachings of Yamazaki and JP 07291791, the resultant method would use no plasma gas within the chamber, as no teachings in either reference discuss introducing such a gas into the chamber to generate light emissions. It is respectfully submitted that independent claims 1, 5, and 17, as amended, are patentable over the Yamazaki and JP 07291791 references.

Dependent claims 2-4, 6-10, and 18-20, are likewise patentable over the cited references, because they encompass the limitations set forth in independent claims 1, 5, and 17, respectively. Moreover, dependent claims 2-4, 6-10, and 18-20 recite additional novel structures, functions, and steps that are even more remote from the teachings of the Yamazaki and JP07291791 references.

V. Conclusion

In view of the above, it is submitted that claims 1-10 and 17-20 are patentable over the cited references under 35 U.S.C. § 103(a).

Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call the undersigned attorney.

Respectfully submitted,

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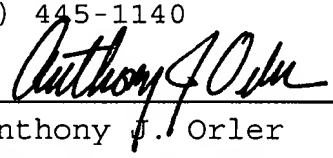
By: 
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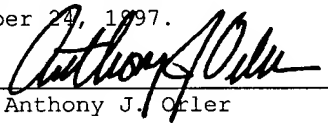
CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service, as first class mail, in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on September 24, 1997.

By: 
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